

REMARKS

Claims 1-2 are pending in this application. By this Amendment, the specification and claims 1-2 are amended. No new matter is added.

The Office Action contains a single rejection of claims 1-2 under 35 U.S.C. § 103(a) as being unpatentable over Beer (British Patent Specification No. 1,480,807). This rejection is traversed as it may apply to the amended claims.

According to the present specification, “[v]ariables affecting electrochemical and physical properties of the oxide anode include an etching method of titanium base metal, a coating method of metal chloride which is coated on the base metal, the number of a coating process, and a sintering temperature. Among the above variables, the sintering temperature is the most important, and it has been defined within a range from 400 to 550°C during the manufacture of RuO₂ or Ir O₂ anodes. The sintering temperature is defined within a range from 400 to 550°C so that the oxide anode has a sufficient anode activity, and low resistance of its surface when RuCl₃ or IrCl₃ used as a coating material of the oxide anode is converted to RuO₂ or IrO₂” (see page 3, lines 12-24, of the present specification, underlining added).

The present specification further explains that “[a]ccording to the present invention, a decomposition efficiency of organic substances by the oxide anode is increased by 50 to 100% because the oxide anode is manufactured at 600 to 700°C, which is higher than a conventional sintering temperature range for manufacturing RuO₂ or IrO₂ anode ... thereby the performance of the catalytic oxide anode is improved” (page 11, lines 7-14, of the present specification).

Thus, the present specification demonstrates unexpected results and advantages when the catalytic oxide anode is sintered at 600°C or to 700°C.

Although Beer mentions a phase of heat treatment of "heating of a temperature ranging from 400° to 650° C "(page 2, lines 12-13), Beer nowhere teaches or suggests the unexpected advantage provided by sintering at 600°C to 700°C, as compared to sintering at a lower temperature. Furthermore, Beer provides no examples of heat treating within the presently claimed range. All of the examples in Beer are directed to a relatively short heat treatment (15 minutes to 50 minutes) at a lower temperature that would not achieve the unexpected results and advantages achieved by the presently claimed invention with sintering at a temperature in the range of 600°C to 700°C for 1 to 2 hours.

Thus Applicants respectfully submit that neither the presently claimed invention of present claims 1 and 2 nor the unexpected results and advantages provided thereby, would have been obvious over Beer for at least the reasons discussed above.

Additionally, an oxide electrode for use in water treatment has been conventionally manufactured through a sintering process at low temperatures (400-550°C). Whereas, in the present invention, the oxide electrode results from a sintering process at higher temperatures (600-700°C), thereby further improving electrode performances, such as decomposition of organic materials.

However, the reason why low temperature sintering has been performed until now, instead of high temperature sintering, is that high temperature sintering suffers from oxidation of an oxide layer-coated base metal, that is, a titanium base metal (titanium oxide has high electric resistance; FIG. 2), and thus, the base metal is diffused even on the coated oxide layer through solid diffusion (FIG. 5), resulting in deteriorating electrode properties of the oxide layer while increasing electric resistance thereof.

To overcome the above problems, in the present invention, a TiO₂-screening layer (a different metal oxide layer (TiO₂, SnO₂, RuO₂, IrO₂) sintered at 450 to 550°C, i.e. the

TiO₂-screening layer for suppressing a production of TiO₂ owing to the oxidation of the titanium base metal (disclosed in the amended specification) is inserted between the titanium base metal and a desired oxide layer (RuO₂ or IrO₂) before the preparation of the desired oxide layer. Thereby, the oxidation and the surface diffusion of the base metal, caused by the high temperature sintering, can be prevented, thus exhibiting better electrode properties (FIG. 4).

On the other hand, Beer, which is discussed above, discloses a heat treatment at 400-650°C. However, advantages of high temperature sintering cannot be found in the cited reference. In contrast, the present invention provides the advantages of high temperature sintering. Thus, the above cited reference and the presently claimed invention are quite different from each other.

Since the disadvantage of high temperature sintering, as mentioned above, is the oxidation of the base metal, a method of suppressing such oxidation should be disclosed in the present invention. Hence, upon manufacturing the oxide electrode, the formation process of the TiO₂-screening layer for use in prevention of the base metal from oxidation is sufficiently described in the original specification of the present invention. That is, the TiO₂-screening layer is intentionally interposed between the base metal and the oxide layer.

However, in order to expedite prosecution of this application and make the presently claimed invention even more clear, Applicants have further defined the formation process of the TiO₂-screening layer. In particular, the function of the TiO₂-screening layer is distinctly represented in the amended specification of the present invention, and as well, is more distinctly defined in claim 2.

For at least the above reasons, reconsideration and withdrawal of the rejection of claims 1-2 under 35 U.S.C. § 103(a) are respectfully requested.

In view of the above remarks, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance of the claims is earnestly solicited. Should the Examiner believe anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, Applicants respectfully petition for an appropriate extension of time. The Commissioner is authorized to charge payment for any additional fees which may be required with respect to this paper to Counsel's Deposit Account 01-2300, referring to client-matter number 101190-00022. Thus, please charge any fee deficiency or credit any overpayment to Deposit Account No. 01-2300, making reference to Attorney Docket No. 101190-00022.

Respectfully submitted,



Robert K. Carpenter
Registration No. 34,794

Customer No. 004372
AREN'T FOX PLLC
1050 Connecticut Avenue, N.W., Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810

RKC/tdd